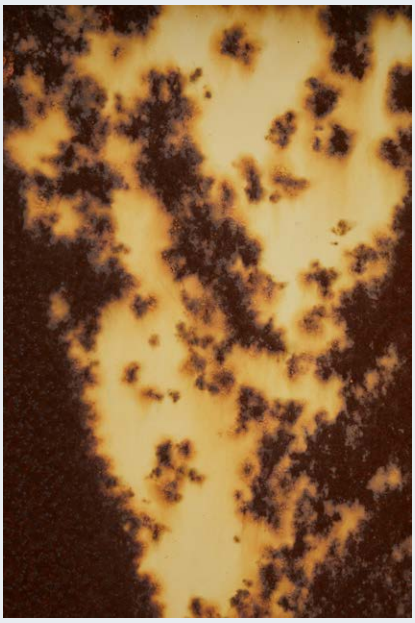
Case Study

weisstechnik and salt spray test chambers
for lithium-ion batteries with temperature control

WHY	HOW	WHAT
Corrosion resistance tests of lithium-ion batteries for electric vehicles with temperature cycling in the world's largest test centre for high-voltage batteries	Turnkey solution According to DIN EN 60068-2-11 and VDA 233-102 Including safety devices (HL4)	Salt spray test chamber Central cooling supply Stainless steel version (V5A) Temperature control included

WHY – The challenge.



FEV Group GmbH has built the world's largest development and test centre for high-voltage batteries for electric vehicles in Saxony-Anhalt. A wide variety of tests are carried out on 15,500 square metres and in around 70 facilities. These include salt spray tests with cyclically changing stresses according to various test standards. The lithium-ion batteries are subjected to salt spray tests, condensation water tests and climate tests with changing and constant temperatures over predefined periods of time.
The cold is supplied via the central refrigeration system. The turnkey test chamber is to be equipped with safety features in accordance with the determined hazard level.

HOW – The idea.

In order to withstand the high stresses caused by climate change and salt solution, the test chamber and all components installed in it must be made of corrosion-resistant stainless steel (V5A).

The salt solution in the test chamber is nebulised via 2-substance nozzles arranged in special spray channels on the side walls. The salt solution is nebulised in the test chamber with humidified, heated compressed air according to the injector principle. This ensures a uniform salt mist distribution over the entire test chamber surface of max. 3.0 +/- 1.0 ml/80 cm^2 h.
The test chamber is heated by electric heaters. For heating, cooling, humidifying and dehumidifying, a recirculation system is provided on the rear wall. Due to the poor thermal conductivity of stainless steel, the stainless steel heat exchangers integrated in it must be dimensioned larger in order to achieve the required temperature change rates.

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WHAT – The solution.

The salt spray test chamber has a test chamber volume of 2,400 l for testing lithium-ion batteries at changing temperatures in a salty atmosphere. The test chamber and the built-in components are made of corrosion-resistant V5A stainless steel.

The machine section of the cabinet behind the test chamber contains all the aggregates necessary for generating the test conditions. Cooling is provided by the central refrigeration system of the test centre.

Selected Product: SC/KWT 2400/40-80/LiHL4

Operation is via a web panel with touch control and the WebSeason operating software as well as the S!MPATI control and monitoring software.

In accordance with the risk assessment for tests with lithium-ion batteries, specific safety devices were integrated. The test chamber was installed in a separate area, and additional safety equipment was provided by the customer.

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Design features:

- Brine storage tank 200 l
- Safety devices according to Hazard Level 4:
  - Electric door locking
  - Status display with signal light and horn
  - Emergency stop button and horn, sounds in case of emergency stop
  - Reversible pressure relief flap to compensate pressure fluctuations in the test area
  - Tension- and pressure-resistant feed-throughs (100 mm diameter, with sealing plug and plug protection on the outside)
- 1-leaf test room door with viewing window (required for condensation water test)
- Siphon for condensate drainage

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